REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested in view of the foregoing amendments and discussion presented herein.

1. Examiner Interview

Applicants wish to thank Examiner Rao for the telephone interview courteously conducted with the Applicants on October 23, 2006. During that interview, Applicants' representative, Robert Kramer, discussed the previously proposed claim amendments with respect to the Empedocles et al. and Hoffman references. No agreement was reached.

2. Rejection of Claims 2-23, and 25-37 under 35 U.S.C. §103(a).

Claims 2-23 and 25-35 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Hoffman (U.S. No. 5,352,512) in view of Empedocles et al. (U. S. No. 6,962,823). These rejections have been overcome in part and traversed in part as follows:.

a. Claim 4

Previously amended Claim 4 recites, among other elements, a method of fabricating a nanotube comprising the steps of forming a nanowire, and depositing a sheath of material over the nanowire, wherein the sheath comprises the nanotube upon removal of the nanowire. In particular, Claim 4 recites a sheath formed from an epitaxial casting. The abovementioned element has not been shown nor suggested by any reasonable combination of the cited art.

Generally, Applicants note that the present rejection does not establish *prima facie* obviousness under 35 U.S.C. §103(a) and M.P.E.P. §§2142-2143. Firstly, the present Office Action has not established that the prior art references, alone or in combination, teach or suggest all of the claim limitations. M.P.E.P. §§2143.02; *In re Royka*, 180 U.S.P.Q 580 (CCPA 1974).

Applicant's fail to identify any teaching or suggestion in either of the Hoffman or Empedocles et al. references for forming a nanotube as an epitaxial casting. Page 3 of

the present Office Action states that Hoffman's "tubes are formed on fibers of carbon, glass, or other fibers (See Abstract) which would automatically suggest that they are formed as the result of and in the context of "epitaxial casting"." (emphasis added) Firstly, Applicant's object to the contention that tubes disclosed in Hoffman "automatically suggest" that they were formed by or teach "epitaxial casting." The words "epitaxial," or "epitaxy" are not used in either of the Hoffman or Empedocles et al. disclosures, and neither reference even remotely suggests such a process.

In the Interview conducted on October 23, 2006, Examiner Rao suggested that "epitaxial," construed broadly, simply means growth of one layer on top of another. However, it is commonly known by those skilled in the art that the terms "epitaxial," or "epitaxy," refer to the "growth on a crystalline substrate of a crystalline substance that mimics the orientation of the substrate." See Exhibit A, Merriam-Webster Online Dictionary, "definition of epitaxy", www.m-w.com/dictionary/epitaxial, 10/23/2006. Correspondingly, Applicants' were unable to find any interpretation or definition of the terms "epitaxial," or "epitaxy" that didn't include an orientation or alignment aspect to it. For example, "epitaxy" has been defined as the "condition in which atoms in a thin film of single-crystal semiconductor material grown on the surface of the same kind of wafer continue their characteristic alignment." See Exhibit B, Stan Gibilisco, The Illustrated Dictionary of Electronics, p. 260, Seventh Edition, McGraw-Hill. "Epitaxy" has also been defined as the "growth of crystals of one mineral on the crystal surface of another mineral, such that the crystalline substrates of both minerals have the same structural orientation." See Exhibit C, American Heritage Dictionary of the English Language, "epitaxy-definition of epitaxy by the Free Online Dictionary, Thesaurus and Encyclopedia", www.thefreedictionary.com/epitaxy, 10/23/2006.

The Hoffman reference is not only absent any suggestion or teaching of orientation between the underlying fiber and surrounding layer, it actually teaches away from an "epitaxial casting," because the tubular structures that it discloses are amorphous materials, e.g. carbon, graphite or quartz (see col. 3, lines 38-41; col. 4,

lines 65-67). As such, these materials have no real or definite crystalline form, and simply cannot be aligned or oriented in the same direction.

Therefore, the combination of Hoffman and Empedocles et al. does not disclose the requisite elements recited in Claim 4. The rejection of Claim 4 (and Claims 2, 3, 6, 7, 9-12, 36 and 37 dependent therefrom), is therefore improper, and should be removed.

b. Claims 5, 8, 13, and 23

Claims 5, 8, 13, and 23 all recite, among other elements, a nanotube comprising a single-crystalline sheath material.

Applicant's fail to identify any teaching or suggestion in either of the Hoffman or Empedocles et al. references for forming a nanotube from a single-crystalline material. As conceded in Page 3 of the present Office Action, Hoffman clearly only discloses fabrication of nanotubes having a polycrystalline or amorphous materials such as carbon or quartz. To cure this deficiency, the Examiner cites Empedocles et al. for allegedly teaching "single crystalline nano-structured nano-wires." However, Empedocles et al. is directed to a method of making nanowires, and is void any discussion of formation of nanotubes. Thus, the combination of Empedocles et al. with Hoffman merely yields a teaching of a single crystalline nanowire surrounded by an amorphous nanotube, and does not teach or suggest the formation of single-crystalline nanotubes.

On Page 6 of the Office Action, the Examiner cites *In re Keller*, 642 F.2d 413, for the proposition that one cannot show obviousness by attacking references individually where the rejections are based on combinations of references. However, Applicants' have not addressed the Hoffman and Empedocles et al. references individually, but rather have shown that the combination of the two references is short of teaching or suggesting the elements recited in Claims 5, 8, 13, and 23. Because the fabrication of nanotubes involves inherently different processes then the fabrication of a nanowire, the combination of the two references has not been shown to successfully yield nanotube

structures. For example, processes used in Hoffman for the removal of the graphite or carbon substrate (fiber, see col. 3, lines 12-14) may serve to remove the nanotube structure as well.

Secondly, with regard all rejected Claims 2-23, and 25-37, no suggestion or motivation, either in the cited references or in the knowledge generally available to one of ordinary skill in the art, has been cited in the Office Action for the proposed combination of the reference teachings so as to produce the claimed invention. M.P.E.P. §§2143.01; *In re Fine,* 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

Applicants were unable to find any suggestion or motivation in the Empedocles et al. for forming single-crystalline nanotubes, nor is there any discussion in Hoffman for providing suggestion or motivation to modify the disclosed carbon-based nanotubes to have a single-crystalline structure.

Page 7 of the Office Action states that "because the two references are analogous art in the same field of technological endeavor there is a substantive technological motivation to combine the two references given they both endeavor in the field of nanotechnology and nanotubes process manufacturing." However, the fact that the references are "analogous art in the same field of technological endeavor," even if true, is independent of and immaterial to the requirement that there be a suggestion or motivation to combine the references as required under §103. Although it may be improper to combine non-analogous art, MPEP 2141.01(a), *In re Oetiker*, 977 F.2d 1443, 1446, Applicants' are unable to find any support for the proposition that analogous art references, by their very nature, provide a suggestion or motivation for their combination.

Hence, the present Office Action has failed to establish a *prima facie* case for obviousness under 35 U.S.C. §103(a), as no motivation to combine the references has been provided. If an obviousness rejection of any of the pending claims is to be upheld, Applicants' request that the examiner provide the necessary suggestion or motivation to combine the references as required by statute.

Because obviousness under 35 U.S.C. §103(a) has not been established, the rejection of Claims 4, 5, 8, 13, and 23 (and dependent Claims 2-3, 6-7, 9-12, 14-22, 25-29, and 36-37) is improper and should be removed.

c. Claims 30-35

Claim 30 recites, among other elements, forming a sheath of a modified first material over a nanowire, the sheath formed on the nanowire by a thermal oxidation process in which temperature determines the thickness of the sheath. Both Empedocles et al. and Hoffman are void any discussion of determining the thickness of the sheath via the temperature of the thermal oxidation process, and the present Office Action has shown no support for such element in either of the references.

Therefore, Claim 30, and Claims 31-35 dependent therefrom, are patentably distinct from the cited art, and their rejection under §103(a) is improper.

3. Amendments Made Without Prejudice or Estoppel.

Notwithstanding the amendments made and accompanying traversing remarks provided above, Applicants have made these amendments in order to expedite allowance of the currently pending subject matter. However, Applicants do not acquiesce in the original ground for rejection with respect to the original form of these claims. These amendments have been made without any prejudice, waiver, or estoppel, and without forfeiture or dedication to the public, with respect to the original subject matter of the claims as originally filed or in their form immediately preceding these amendments. Applicants reserve the right to pursue the original scope of these claims in the future, such as through continuation practice, for example.

4. Conclusion.

Based on the foregoing, Applicants respectfully request that the various grounds for rejection in the Office Action be reconsidered and withdrawn with respect to the presently amended form of the claims, and that a Notice of Allowance be issued for the present application to pass to issuance.

In the event any further matters remain at issue with respect to the present

application, Applicants respectfully request that the Examiner please contact the undersigned below at the telephone number indicated in order to discuss such matter prior to the next action on the merits of this application.

Date: _____ Respectfully submitted,

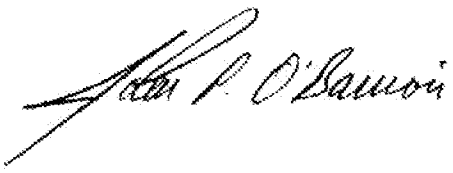

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EXHIBIT A

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epitaxy

One entry found for **epitaxy**.

Browse by letter
A B C D E F G H I
N O P Q R S T U V

Browse words n
epitaxy

Main Entry: **ep·i·taxy**
Pronunciation: 'e-p&-"tak-sE
Function: *noun*
Etymology: International Scientific Vocabulary
: the growth on a crystalline substrate of a crystalline substance that mimics the orientation of the substrate
- **ep·i·tax·i·al** /"e-p&-'tak-sE-&l/ *adjective*
- **ep·i·tax·i·al·ly** /-sE-&-lE/ *adverb*

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EXHIBIT B

The Illustrated Dictionary of Electronics

Seventh Edition

Stan Gibilisco
Editor-in-Chief

McGraw-Hill
New York San Francisco Washington, D.C. Auckland Bogotá
Caracas Lisbon London Madrid Mexico City Milan
Montreal New Delhi San Juan Singapore
Sydney Tokyo Toronto

epitaxial layer A semiconductor layer exhibiting epitaxy. Also see EPITAXIAL GROWTH.

epitaxial mesa transistor See DOUBLE-DIFFUSED EPITAXIAL MESA TRANSISTOR.

epitaxial planar transistor A planar transistor having an epitaxially grown collector on a low-resistivity substrate, and a diffused base and emitter.

epitaxial process See EPITAXIAL GROWTH PROCESS.

epitaxial transistor A transistor in which an epitaxial layer (into which a base region later is diffused and an emitter region alloyed) is grown on the face of a semiconductor wafer, which serves as the collector. Also see DOUBLE-DIFFUSED EPITAXIAL MESA TRANSISTOR.

epitaxy The condition in which atoms in a thin film of single-crystal semiconductor material grown on the surface of the same kind of wafer continue their characteristic alignment. Also see EPITAXIAL GROWTH.

E plane The plane of an antenna containing the electric field.

E plane bend See E BEND.

E-plane tee junction A waveguide junction whose structure changes in the plane of the electric field.

epoxy resin A synthetic resin used to encapsulate electronic equipment, or as a cement. Epoxy resins are based on ethylene oxide or its derivatives.

EPROM Abbreviation of *erasable programmable read-only memory.*

EPU **1.** Abbreviation of *electronic power unit.* **2.** Abbreviation of *emergency power unit.*

Eq **1.** Abbreviation of *equation.* **2.** Abbreviation of EQUALIZER or EQUALIZATION.

equal alternations Positive and negative half-cycles of a wave that have identical shape and amplitude.

equal-energy source A light source that has a constant emission rate (energy per unit wavelength).

equal-energy white The color of light emitted by a source radiating equally the wavelengths of the visible-light spectrum.

equal heterodyne In a beat-frequency system, the condition in which the outputs of the two heterodyning oscillators are identical.

equality circuit A logic circuit that, when two numbers are put into it, outputs logic 1 if the numbers are equal, and logic 0 if the numbers are not equal.

equalization **1.** The use of an EQUALIZER to make the frequency response of a line, amplifier, or other device uniform over a given frequency range. **2.** The use of an EQUALIZER to modify the frequency response of a line, amplifier, or other device.

equalizer A circuit or device, such as a compensated attenuator, that allows the user to tailor the frequency response of a line, amplifier, or other device. Sometimes used in sophisticated high-fidelity stereo amplifier systems, to obtain a desired bass/midrange/treble frequency output.

equalizer circuit breaker A form of circuit breaker that trips in the event of unbalance in an electrical system.

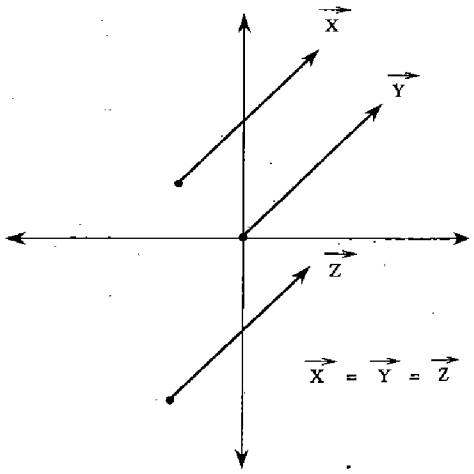
equalizing current A current that flows in the circuit of two compound generators connected in parallel.

equalizing network A circuit used to equalize a line.

equalizing pulses In a television signal waveform, several pulses (preceding and following the vertical sync pulse and having a repetition rate of twice the power-line frequency) that start the vertical retrace at the correct instant for good interlace.

equal-loudness curves See AUDIBILITY CURVES.

equal vectors Vectors having the same magnitude and the same direction. They do not necessarily originate at the same point. Compare IDENTICAL VECTORS.



equal vectors

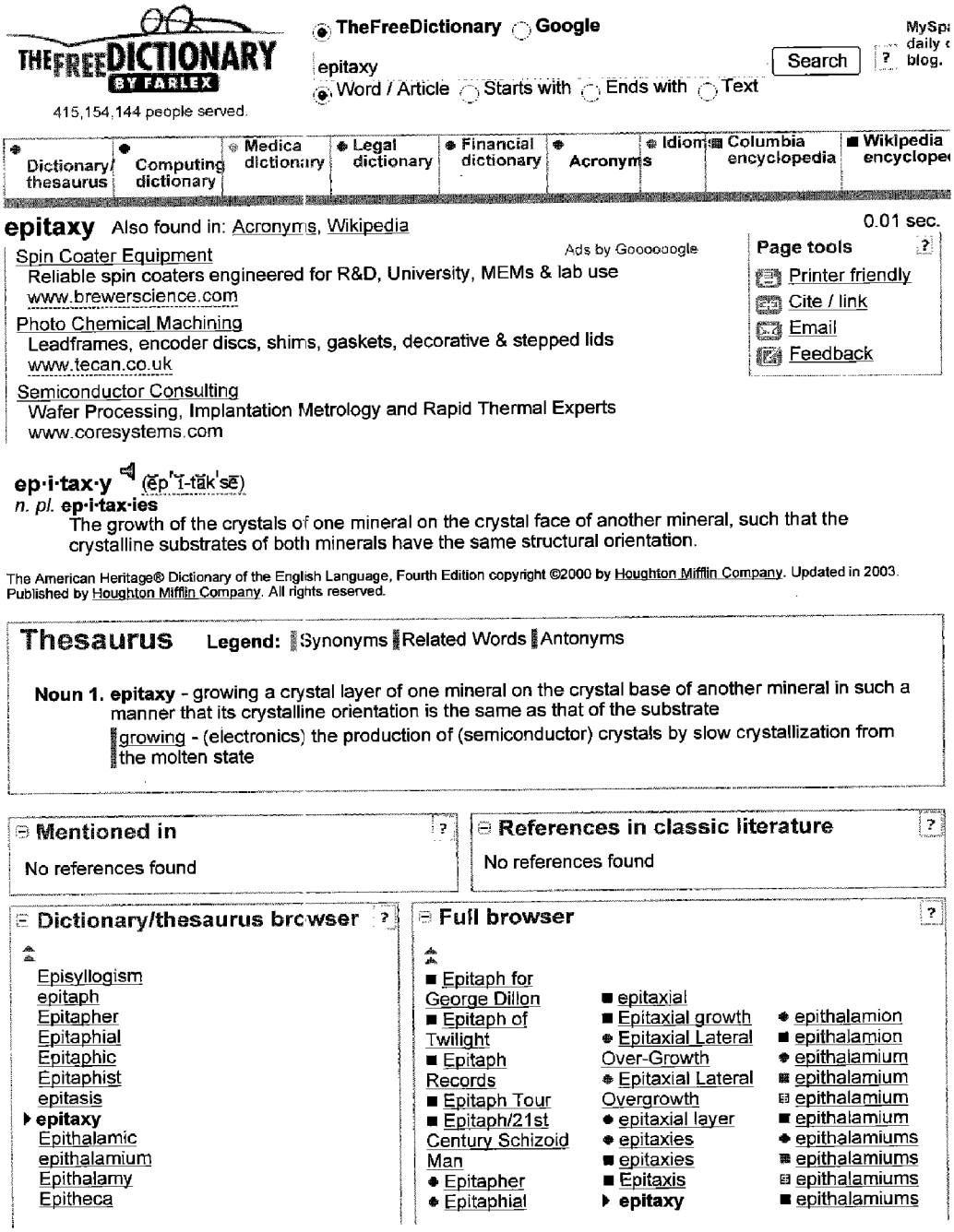
equation solver A (usually analog) computer for solving linear simultaneous equations or for determining the roots of polynomials.

equatorial orbit A satellite orbit that lies in the plane of the earth's equator.

equiphase surface Any surface in a wave, over which the field vectors at a particular instant have either 0° or 180° phase difference.

equiphase zone The space region in which two radionavigation signals show no phase difference.

EXHIBIT C



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ep·i·tax·y (ĕp'ĭ-tăk'sē)
n. pl. **ep·i·tax·ies**
The growth of the crystals of one mineral on the crystal face of another mineral, such that the crystalline substrates of both minerals have the same structural orientation.

Thesaurus Legend: Synonyms Related Words Antonyms

Noun 1. epitaxy - growing a crystal layer of one mineral on the crystal base of another mineral in such a manner that its crystalline orientation is the same as that of the substrate
growing - (electronics) the production of (semiconductor) crystals by slow crystallization from the molten state

Mentioned in
No references found

References in classic literature
No references found

Dictionary/thesaurus browser
Episyllogism
epitaph
Epitapher
Epitaphial
Epitaphic
Epitaphist
epitasis
epitaxy
Epithalamic
epithalamium
Epithalamy
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Full browser
Epitaph for George Dillon
Epitaph of Twilight
Epitaph Records
Epitaph Tour
Epitaph/21st Century Schizoid Man
Epitapher
Epitaphial
epitaxial
Epitaxial growth
Epitaxial Lateral Over-Growth
Epitaxial Lateral Overgrowth
epitaxial layer
epitaxies
epitaxies
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